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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,946	04/16/2004	Stephen Charles Hsu	SAR 14920	8208
28166	7590	08/23/2005	EXAMINER	
MOSER, PATTERSON & SHERIDAN, LLP /SARNOFF CORPORATION 595 SHREWSBURY AVENUE SUITE 100 SHREWSBURY, NJ 07702			ALSOMIRI, ISAM A	
			ART UNIT	PAPER NUMBER
			3662	

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

*Supplemental*  
**Office Action Summary**

Application No.

10/825,946

Applicant(s)

HSU ET AL.

Examiner

Isam Alsomiri

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 19-26 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-11, 13-18, 27-29 and 32 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 12, 30 and 31 is/are objected to.
- 8) ☒ Claim(s) 1-33 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

***This is a supplemental office action for the office action mailed on July 15, 2005.***

***The time for response has been reset from the mailing date of this office action.***

#### ***Election/Restrictions***

Applicant's election of Group I in the reply filed on May 5, 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 1-2, 27-28, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by anyone of Lee et al. US005995681A or Fling US005251271A or Vashisth et al. US006759979B2. (Lee et al. incorporates the teaching of US patent US005550937A)**

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Referring to claims 1, 27-28, and 32, all the references above teaches a method of registering lidar data, comprising: receiving a plurality of lidar frames; and registering at least two of said plurality of lidar frames for determining a sensor pose with respect to a reference (see Abstract of each).

Referring to claim 2, Vashisth teaches the registering step uses information provided by a Global Positioning System GPS (see Abstract).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A or Fling US005251271A in view of Vashisth et al. US006759979B2.**

Referring to claim 2, Lee and Fling are silent about using GPS in the registering process. However, using GPS with lidar frames is well known, Vashisth teaches the GPS with the registering step (see Abstract). It would have been obvious to modify the Lee or Fling references to include the GPS receiver for accurate locations of targets within the images.

**Claims 3, 15-16, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A or Fling US005251271A or Vashisth et al. US006759979B2 in view of Hsu et al. US006078701A.**

Referring to claims 3 and 29, Lee, Fling, and Vashisth, are silent about the registering step comprises: performing a coarse search for determining a translation shift; and performing a fine registration. Hsu teaches the determining the translation shift and the fine registration (see Abstract, figure 3). It would have been obvious to modify Lee, Fling, or Vashisth to determine the translation shift and the fine registration steps for better alignment of the images.

Referring to claims 15-16, Lee, Fling, and Vashisth, are silent about the sensor pose is determined using a bundle approach, where pairwise registration is performed on said plurality of ladar frames separated by different temporal distances. Hsu teaches the claimed pairwise registration (see col. 10 lines 34+). It would have been obvious to modify anyone of Lee, Fling or Vashisth to include the pairwise registration for accurate alignment between the neighboring frames.

**Claims 6-11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A or Fling US005251271A or Vashisth et al. US006759979B2 in view of Hsu et al. US006078701A as applied to claim 3 above, and further in view of Burt et al. US005999662A.** Regarding claims 6-11, Lee, Hsu, and Vashisth are silent about the fine registration step employs an iterated closest points for; eliminating false matches; extrapolated point to compute

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motion; removes points in either ladar frame on an interior of a smooth densely sampled surface from consideration; ignores closest point pairs within said at least two ladar frames with distance exceeding a Limit. Burt discloses in figure 6 the fine registration step employing an iterated closest points for; eliminating false matches 612, 304; extrapolated point to compute motion 608 (see Abstract); removes points in either ladar frame on an interior of a smooth densely sampled surface from consideration (see col. 12 lines 1-10); ignores closest point pairs within said at least two ladar frames with distance exceeding a Limit 612. (see col. 11 line 32 – col. 12 line 20). It would have been obvious to modify the combination to include the ICP methods to eliminate errors in the images.

Regarding claim 13. the combination do not teach a) creating a point cloud from said at least two ladar frames at a plurality of resolution levels; and b) performing said ICP method at each of said plurality of resolution levels. Burt teaches creating a point cloud from said at least two ladar frames at a plurality of resolution levels; and performing said ICP method at each of said plurality of resolution levels (see figures 4 and 6, col. 11 line 32 – col. 12 line 20). It would have been obvious to modify the combination to include the ICP methods to eliminate errors in the images.

**Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A or Fling US005251271A or Vashisth et al. in view of Burt et al. US005999662A.** Lee, Fling, and Vashisth all are silent about the sensor pose is determined using a hierarchical approach, where groups of nearby ladar

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frames are first registered and then are aggregated into composite point sets. Burt teaches the claimed hierarchical approach (see figure 2c, col. 6 lines 8-12).

**Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A, Fling US005251271A, or Vashisth et al. US006759979B2.**

Lee, Fling, and Vashisth all are silent having static noise cleaning is performed before said registering step, and dynamic noise cleaning is performed before said registering step. However, noise cleaning is inherently done in the system prior to the registering step, and it would have been obvious to have static noise cleaning or dynamic noise cleaning depending on the system and which are both very well known method in the art for noise cleaning.

#### ***Allowable Subject Matter***

Claims 4-5, 12, and 31-31 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isam Alsomiri whose telephone number is 571-272-6970. The examiner can normally be reached on Monday-Friday 8:00-5:00.

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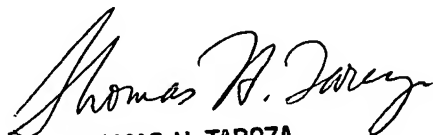
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Isam Alsomiri



July 10, 2005



THOMAS H. TARCZA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3600